SOIL CONSERVATION

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The Pieces Fit Together

Compounded of many minds and measures and conditions, is the conservation of agricultural soils.

It is not enough to invoke the single spark of agronomy or the disciplinary hand of engineering. Real soil conservation merges the work of nature with the work of man. Vegetation joins with concrete, woodland with management, living soils with paper planning.

The picture puzzle (see opposite page) assumes meaning as the segments piece together. This is a depiction of the ideal. In aggregate and in detail, soil conservation consists of having the right plant in the right place; the thimble of water where needed, and when; the clod weighting down the dust particle; the grazing animal in control; the physical pattern basted to the dollar sign.

Wellington Brink & *Editor*

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Cause and Consequence

Proud of their home, prize of the community. This Minnesota family of 11 posed for the picture in 1900—a real event in those days. The photograph was of the kind for parlor albums and civic archives, evidencing the prosperity of fertile acres and an assured income.

The house was built in 1888. A rock wall framed the flower-bedded lawn. Lattice work gave an attractive touch to the front porch.

Can this be the same place? Yes, and part of the family still lives here. The glass is missing from many windows. The rock wall is buried in sand and silt. The old road is under 4 feet of washed-down deposits. The porch, once lattice-ornamented, looks lower, doesn't it? Even the trees are dying.

Here on this soil-robbed hillside is the close-up fingerprint of guilt. Ruthless erosion has left its undisputed mark.

Below the close-up is a more distant view of broken slopes and overgrazed pastures—appropriate background for dilapidated farm buildings which once set the local high standard.

The four pictures supply the continuity for a scenario which, projected in larger dimensions, serves to dramatize a national tragedy.

A DIFFERENT STORY—A HAPPIER DENOUEMENT. Another photographic old-timer, cracked and discolored, shows the Newman family dressed in Sunday best and lined up in front of their farmhouse near Cohocton, N. Y. This was right at the turn of the century, and the background shows great patches of brown amidst the green fields. Severe sheet erosion, the result of incorrect land-use, made the future look dismal.

Eighty-four-year-old Murray Tripp says that the hillside was cleared in 1875. And Mrs. Flora Newman Tripp can remember gathering potatoes when the whole slope between the stump fences at top and bottom was devoted to the growing of the tubers.

Twenty-five years ago the former farmhouse burned and was replaced by the one shown in the very recent picture at the bottom of this page. Harold Stanton is the present owner. The field sores are being healed up rapidly by conservation farming practices. Both house and fields reflect a different philosophy of land use—a philosophy in keeping with the times.

Gullies No Longer

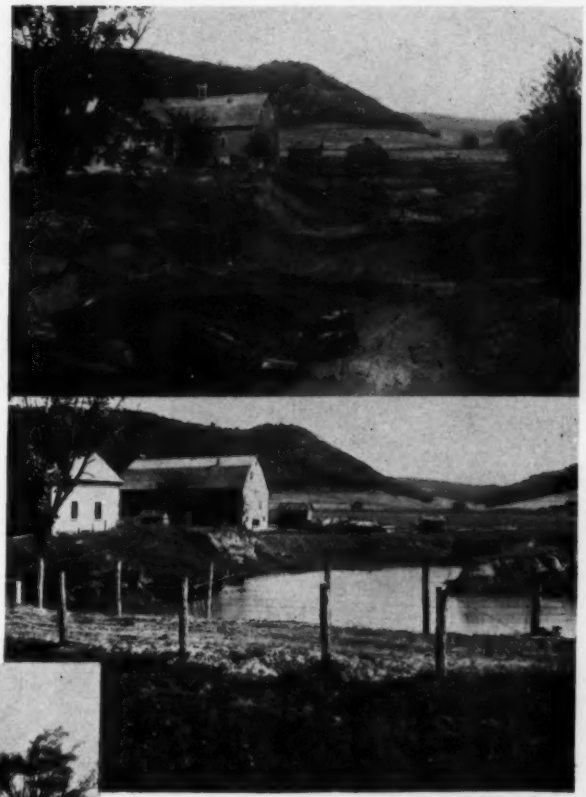
Eye evidence—a pictorial inventory of definite results.

Almost unbelievable is the magic wrought by bulldozer blade, black-locust plantings, lespedezas, and small grain on gnawing gullies in South Carolina. The camera does not lie, and the completeness of the transformation is attested in these "before and after" scenes of the Berry gully near Spartanburg, S. C.—one of the first jobs of the kind completed on the South Tyger River project. From this gully each week over a period of 8 years was washed the equivalent of three 32-ton carloads of material. The gully drained less than 5 acres and was extending at a rate of 100 feet a year. When work began in 1933 it had ruined 40 acres of good bottom land.

Again, the wand of bulldozer, small grain, black locust, contour terraces, a diversion ditch at the head, and Bermuda sod on the terrace ridges. This stablization job pertains to a gully on the C. D. Entrekin farm near Switzer, S. C.

Pick Out the Landmarks

Right: A house and barn in Buffalo County, Wis., threatened with engulfment by a gully. Today they are protected by piling-bulkhead and rock-brush deflecting dams. Note the adequate fencing, the roadway atop the fill, the useful farm pond.



Relate the "As Is" to the "As Was"

Left: A sea of drifting sand, 6 feet deep in places, pounding at farm buildings in Beadle County, S. Dak. The "after" view attests the miracle performed by cover crop planting of cane and Sudan grass, listed on the contour.

Once Bare—Now Protected

Gone here, near Spencer, W. Va., not only the vegetation but the organic matter and a lot of the subsoil. The soil moves down so fast during a gully washer that few plants dare try to cover the surface.

Sweetclover and Korean lespedeza are among these few plants and in this later picture, given a favorable start by the Soil Conservation Service, they are making real headway.

This sunflower buffer strip has a threefold purpose: (1) To break the force of wind in summer; (2) to cause a deposition of snow next to new windbreak plantings, in winter; and (3) to provide food for wildlife.

Contrasts: Conservation

Are these the same farms? The answer is No—they are *better* farms.

At the top is the Lena M. Jefferson place, 4 miles northeast of Wolsey, S. Dak., in the spring of 1936. Subsoil is exposed, rocks show on the surface, despite emergency listing done for control purposes. Partial stabilization was effected that year by listing and by broadcasting oats.

By early August 1937, however, cane and Sudan grass as emergency cover crops had halted the erosional process and prepared the way for permanent stabilization of the land.

Immediately below, another Beadle County (S. Dak.) farm, as it responded to identically the same agricultural prescription—cane and Sudan grass listed on the contour.

These good farm buildings were abandoned during the 1935 drought and dust storms. During that season soil drifted 6 feet deep around these structures. Record dry weather in 1936 retarded stabilization. The cover crops were seeded in 1937 and by early August had provided effective protection against further blowing, giving promise of permanent stabilization and possible reoccupation under proper soil and moisture-saving methods.

A cavity that was giving trouble in Wisconsin. Gully heads were advancing at the rate of 40 feet per year.

Control—thanks to a drop inlet structure.

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Faithful guardians of the good earth. Leaf, twig, limb, bark, and clinging root and rootlet sift the rain; build and hold the soil.

Trees must be protected, if they are to protect. Part of the complete soil conservation program is farm woods—managed farm woods. And part of management is fencing to keep out livestock; pruning, thinning by selection, shrubbery borders to weaken wind stress, and to provide food for feathered friends.

The 185,000,000 acres now in woods on farms in the United States and the possibility that this area may reach a total of 250,000,000 are indications of the magnitude of this problem; another concerns farm fields which should be used for trees and shrubs.

By the close of 1937, farmers had agreed to operate 1,549,000 acres of their holdings in accordance with principles of forest management drawn up by Soil Conservation Service foresters for each tract. This frequently involved the preparation of comparatively detailed, though simple, plans based upon growth data, required farm needs, and the growing stock. Each plan fits definitely into the complete farm program as worked out by technicians.

A total of 350,000,000 trees and shrubs had been planted on approximately 217,500 acres at the close of 1937. Although locust and various species of pine predominate in the list, many other species adapted to the various sites have been used.

Other means of interesting the farmer in appreciating the farm woods, as a means of erosion control and profit, have already included the demonstration of woodland management on almost 25,000 acres in the woods of more than 5,000 cooperating farmers.

Trees, litter, undergrowth combine to defeat the erosional process.

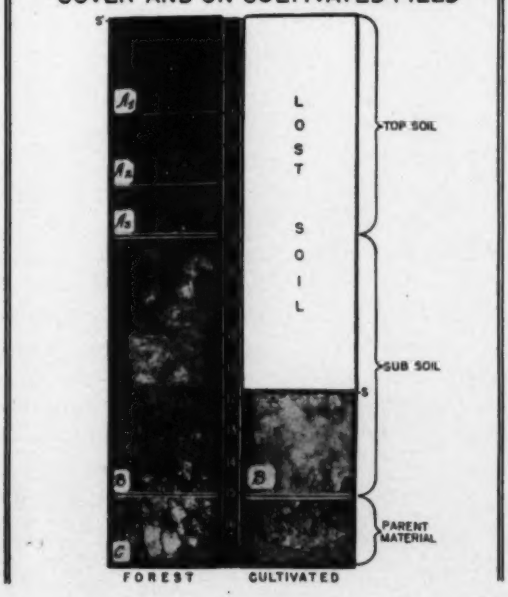
A worm's-eye view of a tulip poplar.

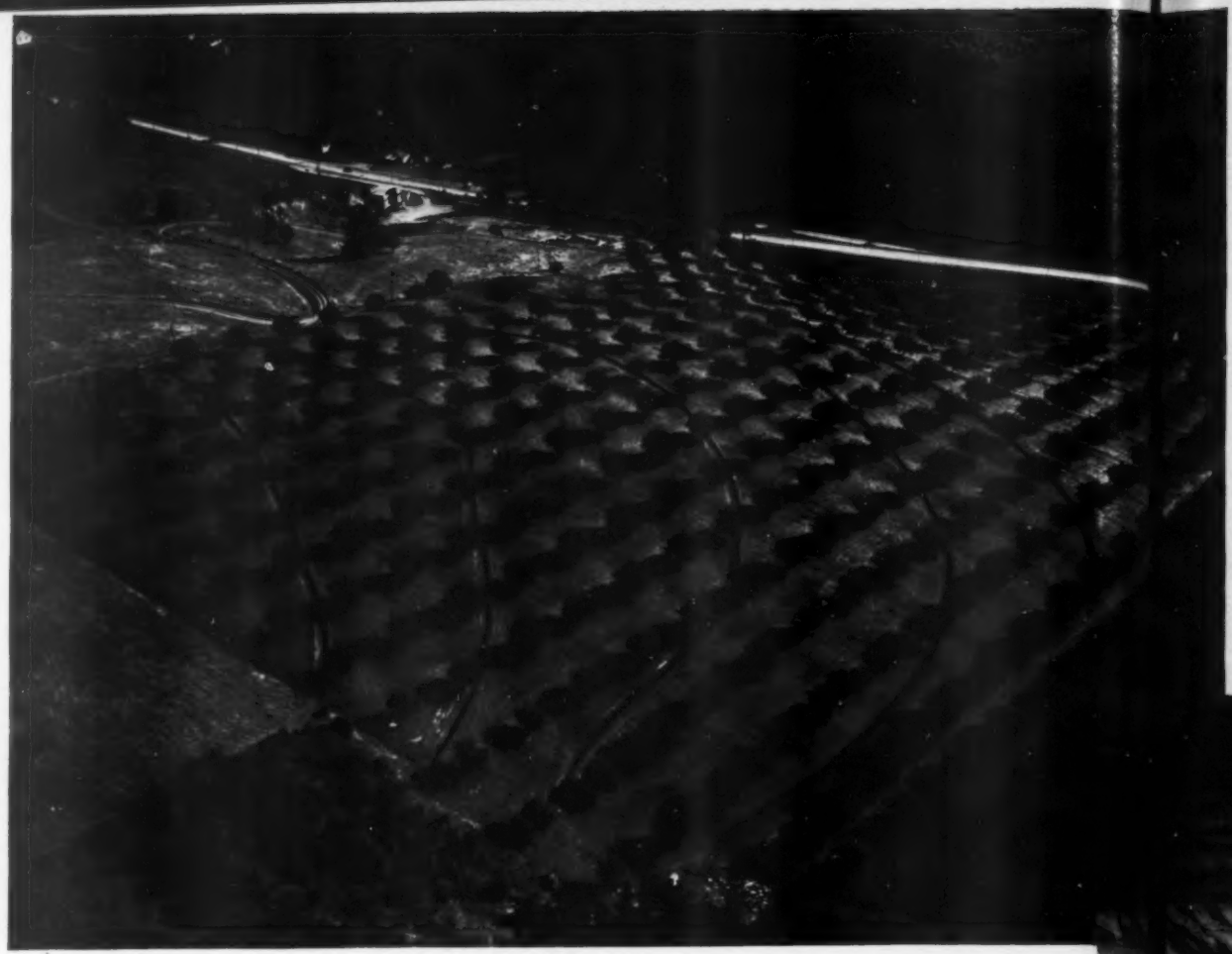
Toes gripping the soil—a freak growth illustrative of the way forest feet circumvent shifts and losses of soil.

TITLE PICTURE
OPPOSITE

Corner of a 20-acre field completely enclosed by windbreaks. Snow, unblown, sometimes has piled 5 feet deep, storing moisture for the growing season.

COMPARISON OF EROSION UNDER FOREST COVER AND ON CULTIVATED FIELD





(Right)

Strip cropping, both contour and straight, as practiced on the Goshen Hole erosion-control area 38 miles west of Torrington, Wyo., in the fall of 1937.

In the foreground of this air view are 48-foot contour strips on the F. A. Schamel farm; right, adjacent, are 10-rod wind strips on the C. F. Goertz place.

A portion of the escarpment circling the area is discernible in the left background.

(Left)

This 26-acre walnut orchard on the farm of Helen Whitaker, 4½ miles northeast of Newberg, Clatsop County, Oreg., was diversion-ditched by the Soil Conservation Service in the summer of 1937.

The ditches are of the standard 2-foot narrow-base drainage type terrace, spaced at 20-foot vertical intervals. They have a gradient of from one-fourth to one-half percent and drain to a sodded outlet. The three in the middle were seeded to grass which it is planned to maintain permanently.

The walnut trees are 20 years old, set 60 feet apart. Slopes, 10 to 30 percent. Soil, Olympic silty clay loam.

"Grass is the forgiveness of Nature—her constant benediction. * * * Beleagured by the sullen hosts of winter, it withdraws into the impregnable fortress of its subterranean vitality and emerges upon the solicitation of Spring. Sown by the winds, by wandering birds, propagated by the subtle horticulture of the elements, which are its ministers and servants, it softens the rude outline of the world. Its tenacious fibers hold the earth in its place, and prevent its soluble components from washing into the sea."—*John J. Ingalls.*

PICTURE 1. The thick matting of Bermuda grass in this waterway must be pressed down to the floor of the channel, to prove that a good amount of water is actually passing.

PICTURE 2. Action of water in meadow strip featured by sod baffles.

PICTURE 3. Western wheat grass sods this terrace outlet channel.

PICTURE 4. Burning of stubble is a common practice which often leads to lowered yields and wind-erosion disaster.

PICTURE 5. Isolated hummocks held by vegetation. Concentration of livestock around watering places kills grass and invites erosion.

PICTURE 6. Buffalo grass, shown here in a terrace outlet channel, spreads by sending out runners which root to form other plants.

PICTURE 7. A good turf consisting of grasses and clovers produces abundant feed and provides control against loss of soil and water.

PICTURE 8. Alkali ryegrass in nursery.

PICTURE 9. Large volumes of water are discharged from terraced fields without damage; this channel was seeded to grass with a strip of oats every 10 feet.

PICTURE 10. In this meadow strip the water is spread out. The blades of grass lie flat in the channel, and erosion is negligible.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700 Years in Grass

The scenes on this page were taken on a farm in Leicester, England, by C. R. Enlow, in charge of the agronomy and range management section, during the International Grassland Congress in 1937. The farm's 400 acres are entirely in grass, mainly perennial rye and wild white clover. The pastures are generations old, the bedding effect observed on the far slope of the picture below having been achieved when the land was cultivated 700 years ago.

The owner buys his cattle and sheep and sells grass-fattened animals once, and sometimes twice, a year. He guards against both overgrazing and undergrazing, and gets an average of 280 pounds of beef and 80 pounds of mutton per acre.

Mr. Enlow was on four of the pastures. He found them grazed to a height of approximately 2 inches, with numerous tussocks of grass around the droppings which were scattered during the winter. These pastures, like all good English pastures are fertilized liberally, usually with basic slag.

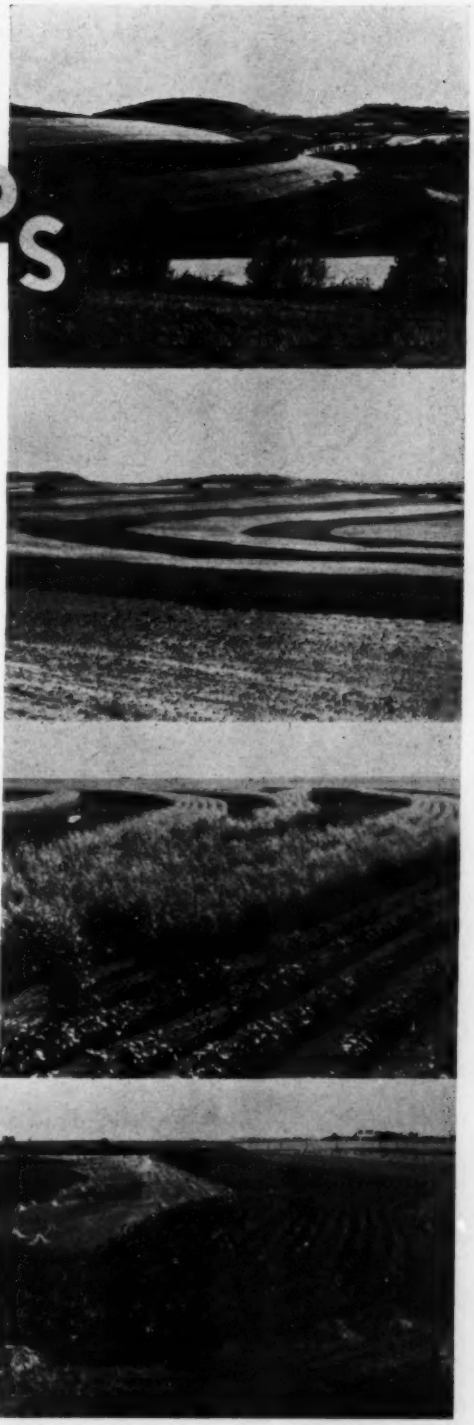
English farmers invariably graze cattle and sheep together. The Cockle Park Experiment Station has found through a 21-year experiment that for every pound of liveweight increase per acre obtained from grazing with sheep alone on Tree field, 2 pounds per acre were obtained on the Hanging Leaves plot stocked with cattle and sheep. Much better utilization of the forage results from grazing cattle and sheep together.

TWO SIGNIFICANT ISSUES

Tentatively scheduled for July and August are special issues of more than ordinary importance. Each will be devoted to the subject of better land use—the first discussing program, the second pertaining to planning.

Among the contributors will be Secretary Wallace, the chiefs of the several bureaus immediately concerned, and the Department's coordinator of land-use planning.

STRIPS



Contour strip cropping is a practice that was picked up from farmers in Wisconsin, New York, Pennsylvania, Ohio, and West Virginia who are farming rolling land and fairly steep hillsides. On some farms, a modified form of strip cropping has been carried on for many years.

Contour strip cropping is a general practice in some localities in France on rolling land. Small grains, legumes, and root crops are used in rotation on the strips.

Since the Soil Conservation Service was started in the fall of 1933, 879,532 acres of land on SCS projects and camps throughout the country were contour strip cropped by December 31, 1937. On some project areas, the practice is almost universal, and many farmers who farm land adjoining the projects have taken up the practice.

This practice is not a cure-all. On long slopes, and particularly where a distinct "erosion pattern" has been formed and the best of the soil has been washed away, strip cropping should not be attempted without first constructing terraces or diversion ditches to dispose of the excess water.

Contour strip cropping is a practical method of farming on erosive slopes with a minimum loss of soil. It is merely a field arrangement and can in no way substitute for the use of proper crop rotation. In fact, an excellent strip cropping system embodies the best crop rotations. The rotations can be worked out by strips or by fields so that wheat stubble and hay aftermath can be grazed. Strip cropping is readily adapted for the livestock farm. For cash crop areas, it leads toward diversification, which is so essential to a truly permanent agriculture.

Our agriculture is not set up along proper land-use lines. Many farms have little level land to till but crops must be grown to furnish an income. If we expect to carry on a truly permanent agriculture on sloping, erosive land, it means every possible method of controlling erosion and maintaining the organic matter content of the soil must be employed. The use of lime, fertilizers, and soil-improving crops must be supplemented by terracing and the best possible arrangement of our crops on the land. Contour strip cropping has a real place in this program.

TERRACES

Since 1934 more than a million acres of crop land have been terraced as a result of the Soil Conservation Service demonstration project and camp activities. A compilation of Department of Agriculture Extension Service Reports indicate that several million acres have been terraced as a result of county agent activities from 1915 to date. It has been estimated that previous to 1915 bench terraces and hillside ditches in the southern States were used on about two million acres and the narrow ridge-type terrace on an equal acreage.

The development of terracing as recommended today has required years of use, extensive field observations and experimentations, and many modifications from time to time in construction procedure. When terraces are properly used and constructed and adequately supported by approved cropping and tillage practices they provide one of the most effective erosion - control measures applicable to cultivated lands. When improperly constructed or not coordinated with proper land-use practices they often accelerate rather than retard soil losses.

CONTOUR FURROWS

Contour furrowing is relatively new, but it has proved very beneficial on range and pasture land, particularly in western semi-arid regions. It improves both the quality and quantity of vegetative cover. More than 401,000 acres have been furrowed or ridged in project and camp areas.

Contour furrows are small and constructed on the contour. In humid areas their primary function is soil conservation, while in areas of low rainfall it is conservation and distribution of moisture that would otherwise be lost. The amount of water they can retain depends upon their water cross-section area, their spacing, and the absorption characteristics of the soil. To obtain uniform distribution of moisture, spacing should seldom exceed 10 feet.

Most contour furrows have been made by moldboard plows, listers, graders, and subsoilers. The most satisfactory ones are obtained by low cost machines, which do the work without destroying existing turf. Several attempts have been made to develop special machines for the purpose.

Typical of the specialized equipment to meet the new requirements are the devices pictured here: (1) Heavy type sod cutter for cutting native sod strips; (2) experimental strippers developed for harvesting native grass seed; (3) seed pan used for harvesting seed crops on small areas; (4) mole drainage plow used for underground drainage; (5) homemade subsoiler made from a tractor plow; (6) basin lister; (7) one-way disc plow used in Northwest to establish trashy fallow; (8) another type of contour furrowing machine, working in native sod.

Results, at a Glance. What the experiment stations show.

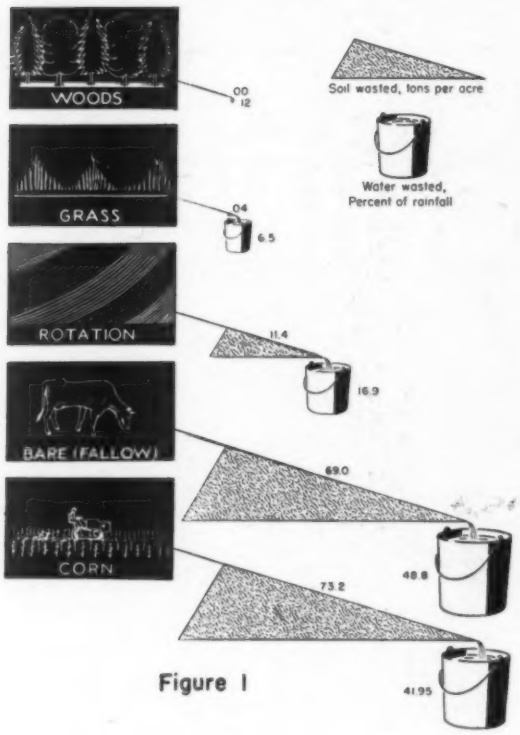


Figure 1

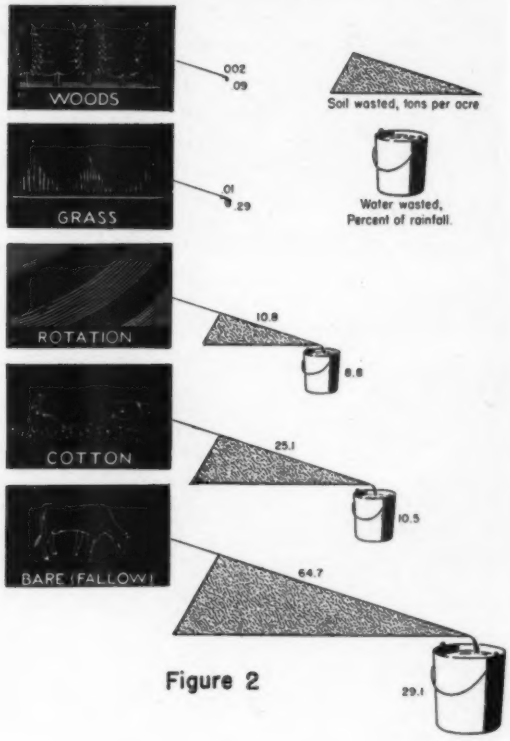


Figure 2

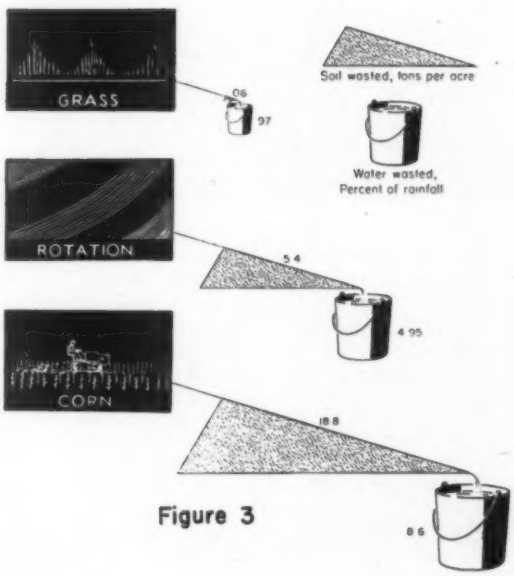


Figure 3

Figure 1

Annual losses of soil and water from same kind of land (Muskingum silt loam, 12-percent slope), with same rainfall, from woods, grass, rotated fields, bare land, corn (S C S station, Zanesville, Ohio, 1934-36

Figure 2

Annual losses of soil and water from same kind of land (Cecil sandy clay loam, 10-percent slope), with same rainfall, from woods, grass, rotated fields, continuous cotton, bare land (S C S station, Statesville, N C., 1932-36)

Figure 3

Annual losses of soil and water from same kind of land (Marshall silt loam, 9.0-percent slope), with same rainfall, from grass, rotated fields, corn (S C S station, Clarinda, Iowa, 1933-35)

Results at a Glance. What the experiment stations show.

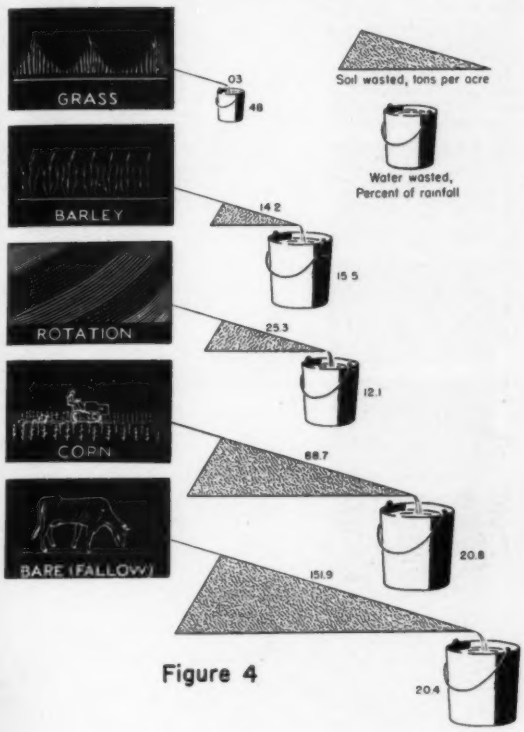
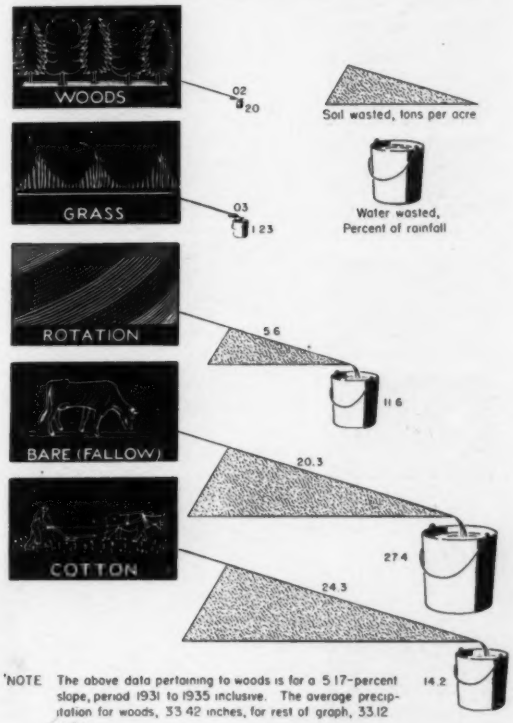


Figure 4



'NOTE The above data pertaining to woods is for a 5.17-percent slope, period 1931 to 1935 inclusive. The average precipitation for woods, 33.42 inches, for rest of graph, 33.12 inches

Figure 5

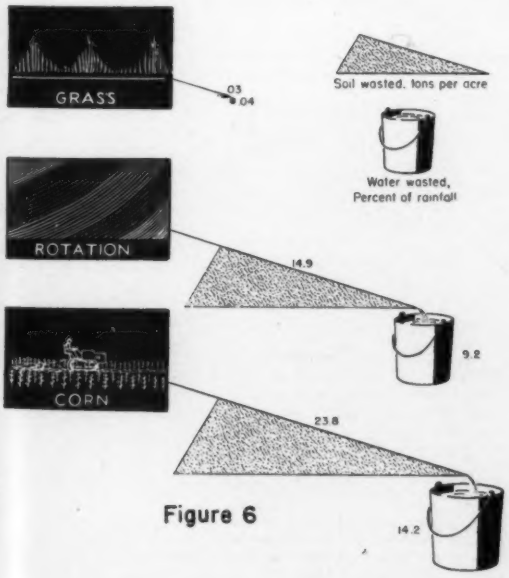


Figure 6

Figure 4

Annual losses of soil and water from same kind of land (Clinton silt loam, 16.0-percent slope), with same rainfall, from: grass, continuous barley, rotated fields, continuous corn, bare land (S. C. S. station, La Crosse, Wis., 1933-35)

Figure 5

Annual losses of soil and water from same kind of land (Vernon fine sandy loam, 7.7-percent slope), from woods, grass, rotated fields, bare land, cotton (S. C. S. station, Guthrie, Okla., 1930-35)

Figure 6

Annual losses of soil and water from same kind of land (Houston black clay, 4-percent slope), with same rainfall, from grass, rotated fields, corn (S. C. S. station, Temple, Texas, 1931-36)

Results, at a Glance. What the experiment stations show.

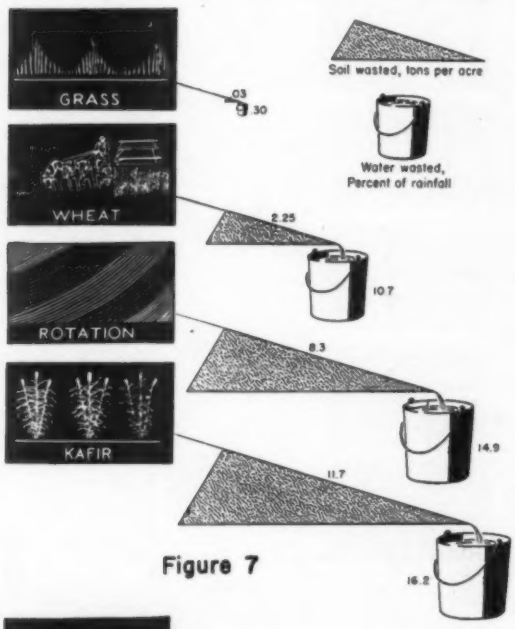


Figure 7

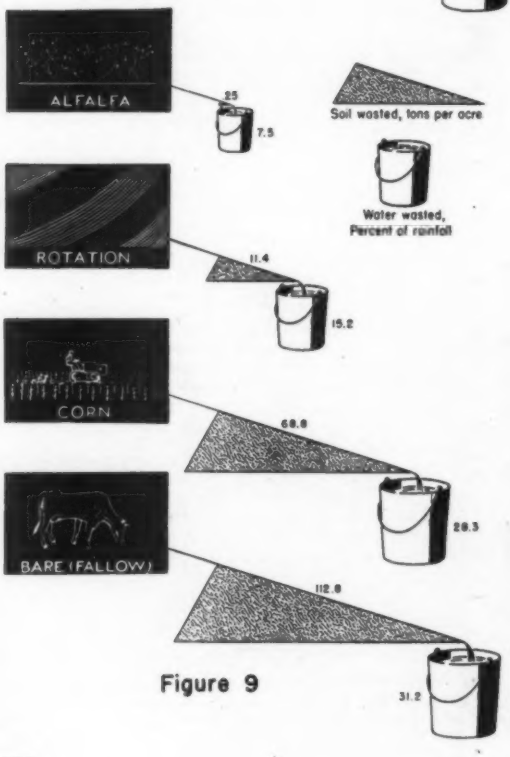
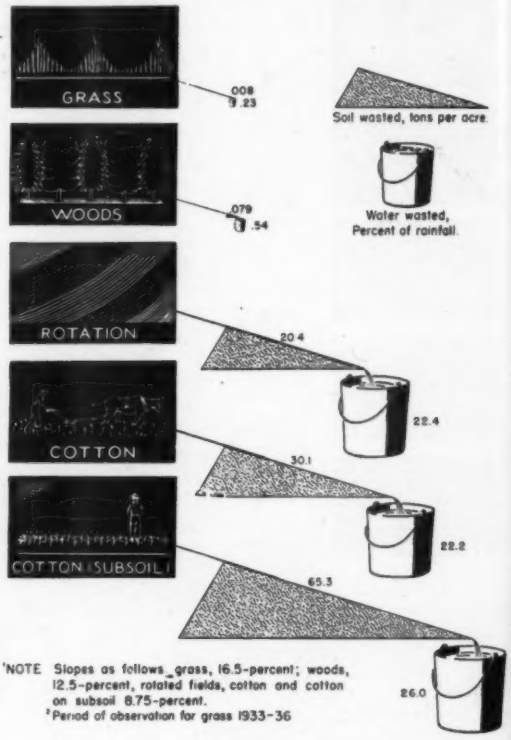


Figure 9



[1]NOTE Slopes as follows—grass, 16.5-percent; woods, 12.5-percent, rotated fields, cotton and cotton on subsoil 8.75-percent.
[2]Period of observation for grass 1933-36

Figure 8

Figure 7

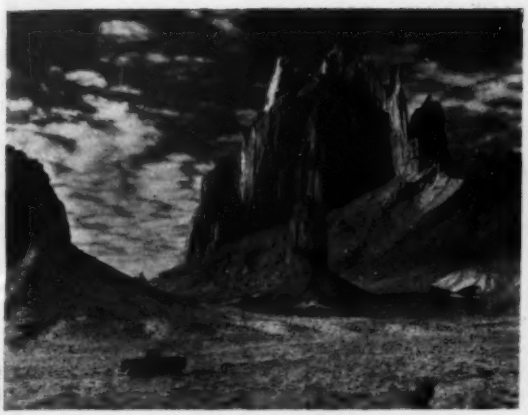
Annual losses of soil and water from same kind of land (Colby silty clay loam, 5.0-percent slope), with same rainfall, from grass, wheat, rotated fields, continuous kafir. (S C S station, Hays, Kan., 1930-35)

Figure 8

Annual losses of soil and water from same kind of land (Kirvin fine sandy loam, various slopes), with same rainfall, from grass[1], woods, rotated fields, cotton, cotton on subsoil (S C S station, Tyler, Texas, 1932-36)

Figure 9

Annual losses of soil and water from same kind of land (Shelby silt loam, 8-percent slope), with same rainfall, from alfalfa, rotated fields, corn, bare land. (S C S station, Bethany, Mo., 1931-35)



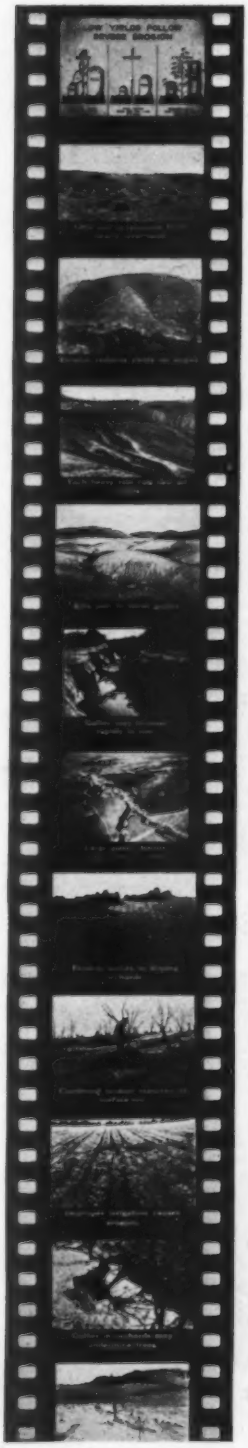
Shiprock, N. Mex.—Geological erosion above, accelerated erosion around base.

Sand dunes at Laguna, Valencia County, N. Mex. The accumulation of sand is on the east slope of the ridge; the main dunes may be seen in the background.

An excellent example of contour fencing in the west. This device is of proved advantage in farming for soil conservation.

An old mesquite stump in Arizona, sprouting several years after being cut.

Proper conservation methods on forest, range, and farm lands do much to sustain the clear flow of water in streams and rivers, to benefit wildlife, to protect breeding places of fish and fowl, and to increase recreational opportunities.



Pictures That Tell the Story

By Horold G. Anthony[1]

SEEING is believing. Trite though the expression may be, the truth expressed in those three words makes them worthy of frequent use. This becomes particularly so, when it comes to transmitting ideas and establishing facts pertaining to the Soil Conservation Service program.

It is generally agreed that the best way to get a "picture" of the whole, or a single phase of the program for soil and moisture conservation in any given project, is to visit that area and "see" the program in its actual application. Since such a visit is not always possible, the next best thing is to bring the project to an individual or to a group of individuals by means of pictures.

Those who have worked with methods of expressing and conveying ideas, have had to face one fundamental problem: How to portray the exact meaning. A dictionary will define a word, but its full connotation is compounded of one's experience and imagination.

A well-taken photograph, on the other hand, has no dubious connotation. It is exact. Its meaning cannot vary as it passes an idea from one mind to another.

On the right of this page is a section taken from the film strip, "Erosion Control in the Southeast." On the left is a section of the strip entitled, "Soil Conservation in California." Study these pictures closely. Without regard to the underlines, which are used primarily for the sake of continuity, note that each picture makes a direct, declarative statement. Like a newspaper headline, each picture states its fact with dramatic simplicity. Every reader gets the identical statement, the same fact.

Pictures condense the thought and penetrate to the heart of an idea. Plainly and simply each picture tells its particular story—a story that is readily accepted because it is seen as true.

To get an idea from talk and type, words and figures must be remembered. When you look at a picture you have only to carry away an impression. Facts presented in pictures are easily grasped and easily remembered.

Use of the correct picture for telling the story of soil conservation becomes increasingly important through whatever vehicle may be employed, such as simple photographs, film strips, motion pictures, transparencies and enlargements.

After all "seeing *is* believing."

[1] In Charge, visual information, Soil Conservation Service, Washington D. C.